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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES

In re patent application of
Brian Allen
Serial No. 09/496,111 Group Art Unit: 2631
Filed: February 1, 2000 Examiner: Williams, Dementria A.
For: INTERLEAVED FINITE IMPULSE RESPONSE FILTER

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPELLANTS' APPEAL BRIEF

Sirs:

Appellants respectfully appeal the final rejection of claims 1-4, 6-11, 13-17, 19 and 20 in the Office Action dated January 21, 2004. A Notice of Appeal was timely filed on April 20, 2004.

I. REAL PARTY IN INTEREST

The real party in interest is International Business Machines Corp., Armonk, New York, assignee of 100% interest of the above-referenced patent application.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellants, Appellants' legal representative or Assignee which would directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

Claims 1-4, 6-11, 13-17, 19, and 20 are all the claims pending in the application and are set forth fully in the attached appendix. Claims 1-20 were originally filed in the application. Claims 5, 12, and 18 were cancelled by Appellant in an Amendment filed on February 21, 2003. Claims 1-4, 6-11, 13-17, 19, and 20 stand rejected on prior art grounds. Specifically, claims 1-4, 6-11, 13-17, 19, and 20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Eastty et al., hereinafter "Eastty" (U.S. Patent No. 6,188,344) in view of McNeely (U.S. Patent No. 6,466,277).

IV. STATEMENT OF AFTER-FINAL AMENDMENTS

An after-final Response that made no claim amendments was filed on March 18, 2004. An Advisory Action dated March 31, 2004 indicated that, upon filing an appeal, the Response filed on March 18, 2004 did not place the application in condition for allowance, and that the rejections of claims 1-4, 6-11, 13-17, 19, and 20 would remain. The claims shown in the appendix are shown in their amended form as of the November 13, 2003 Amendment.

V. SUMMARY OF THE INVENTION

Referring to claim 1 as an example, to Figure 3, and page 6, line 16-page 7 line 16, and page 8, line 1-line 8 of the specification, the claimed invention includes a first input 10 for receiving even samples and a second input 11 for receiving odd samples.

There are two sets of summation units (upper and lower portions of the structure shown Figure 3) where one of the sets of summation units outputs and even output and the other summation unit outputs an odd output. One of the features of the invention is that each of the summation units includes two multipliers and an adder. Using the left

summation unit in the upper set of summation units in Figure 3 as an example, the multipliers are shown as h8 and h9, while the adder is shown as item 13. In addition, there are delay elements D positioned between the summation units. This structure reduces the size of the filter by eliminating half of the delay devices D, when compared to conventional devices and has the same latency and approximately half the number of storage elements as conventional devices.

Therefore, with respect to specific claim language, the claimed structure shown in Appellant's Figure 3 includes one set of summation units that output an even filter output (the upper set of summation units) and a second set of summation units that output an odd filter output (the lower set of summation units). With respect to the claimed structure, independent claims 1 and 15 define that "a first set of summation units has an even output and a second set of said summation units has an odd output." Independent claim 8 similarly defines that "a first set of successive partial summation units has an even output and a second set of said successive partial summation units has an odd output."

VI. ISSUES PRESENTED FOR REVIEW

The issues presented for review by the Board of Patents Appeals and Interferences are whether 1-4, 6-11, 13-17, 19, and 20 are unpatentable under 35 U.S.C. §103(a) over Eastty view of McNeely. Appellants respectfully traverse these rejections.

VII. GROUPING OF THE CLAIMS

As supported by the following arguments, the claims are each independently patentable and do not stand or fall together. More specifically, the dependent claims are patently distinct from the independent claims from which they depend because each dependent claim defines additional features which are not defined in the independent claims or which are defined more broadly in the independent claims. As discussed in

greater detail below, the features defined by the dependent claims are not merely illustrations or examples but include patentable features which prevent the dependent claims from standing or falling with their associated independent claim.

VIII. ARGUMENT

A. The Prior Art Rejections

1. The Position in the Office Action

In the Office Action dated January 21, 2004, the rejections are as follows:

> Regarding claims 1, 8, and 15 Eastty discloses a filter/modulator having an input that is separated into even and odd samples and summation units for processing even and odd samples separately (see generally figure 7; column 5, lines 25-47) The summation units comprise two multiplier's directly connected to the input for multiplying the provided samples, and adder for adding the multiplied samples, and delay elements between each summation unit. Looking at figure 7 of the Eastty patent, the first summation unit for even samples consists of elements Bi, 61, 71, and C 1. Elements B 1 and C 1 are used for multiplying the samples, element 61 represents the adder, and element 71 is a delay. The summation unit for odd samples consists of elements Al, 61, 71, and C1, which operate in a manner similar to that of the odd samples. Even though the summation units are integrated as opposed to separate as claimed by the Appellant, making items separable does not patently distinguish the claimed invention over the prior art.
>
> Eastty does not disclose separate outputs for the even and odd samples, but instead sums them together and outputs an integrated signal. McNeely discloses a filter where odd and even samples are output separately (see generally column 4, lines 1-65). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Eastty to include

separate outputs for even and odd samples, as taught by McNeely, for those applications required continued Processing of the signals separately

Regarding claims 2 and 9, Eastty further discloses that the delay elements are collected to an adder of each "summation unit" (see generally figure 7; column 5, lines 25-47).

Regarding claims 3, 10, and 16, McNeely further discloses that the filter includes an initial delay element and multiplier (see generally figure 4; column 4, lines 1-65. It would have been obvious to one of ordinary skill in the art at the time of the invention to include these additional elements initialize the filter.

Regarding claims 4, 11, and 17, Eastty further discloses that the multipliers receive the samples directly from the input, before being delayed (see generally figure 7; column 5, lines 25-47).

Regarding claims 6, 13, and 19 Eastty discloses that each adder receives and odd multiplied sample from one multiplier and an even multiplied sample from the other multiplier (see generally figure 7; column 5, lines 25-47).

Regarding claims 7, 14, and 20, Eastty discloses all of the elements as described above. However, as explained in reference to claim 1, the even and odd "summation units" are integrated as opposed to separate. Because of this, each adder receives three samples. However; it would have been obvious to one of ordinary skill in the art that given separate units for even and odd, each adder would only receive two samples.

In the Advisory Action dated March 31, 2004, the rejections are stated as follows:

Applicant argues in the bottom of page six to the top of page 7 that the even and odd in McNeely are even and odd taps. Then the applicant says in the first full paragraph of page 7 that the even and odd in McNeely is not really even and odd samples since McNeely is alternately drawing data from the alternate subfilters. So applicant seems to be arguing that alternately drawing data does not result in even and odd data. This is not persuasive. For

example, suppose data samples 1 to 10 exist. By alternately drawing from this data sample for each of the subfilters, the result• will be that one subfilter will receive odd data samples of 1, 3, 5, 7, 9 and the other sub filter will receive even data samples of 2, 4, 6, 8, 10.

Applicant begins to argue on the third paragraph on page 6 about separate summation units not being disclosed and then concludes in the same paragraph with filter inputting and processing odd and even inputs being disclosed while in the middle of the paragraph, applicant discusses vestigial sideband. It is not clear to the office what applicant is arguing. If applicant is saying that separate summation units are not taught by the reference, then the office has already admitted that but has also said that since a summation unit is taught, it is obvious to separate that summation unit. Applicant does not argue against this reasoning.

Applicant argues in the bottom of page 7 and first full paragraph of page 8 that the outputs are complex outputs rather than even and odd outputs. This is not persuasive since outputs from such as the even symmetric filter in figure 19 of McNeely are the even outputs and the outputs from such as the odd symmetric filter also in figure 19 of McNeely are the odd outputs.

Applicant argues also on page 8 and the second paragraph in page 9 that the combination of cited references does not result in processing at twice the rate. This is not persuasive since applicant has not claimed processing at twice the rate. Also, since McNeely is alternately drawing data from the alternate subfilters (col. 4 last paragraph, text surrounding toggle), this process is interleaving data.

Applicant argues in the second paragraph in page 9 of other benefits to its invention. These are not persuasive since those benefits have not been claimed.

Applicant argues with references individually on the bottom of page 8 and top of page 9. This is not persuasive since as explained in the prior action, the rejection was based on a combination of references.

In response to applicant's argument on the bottom of page 7 that McNeely is structurally unrelated to Eastty, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller,* 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

2. Appellants' Position

a. Independent Claims 1 and 15

i. No Prima Facie Case of Obviousness

It is Appellants position that McNeely is fundamentally unrelated to either Eastty or the claimed invention because the structure disclosed in McNeely does not process even and odd samples to achieve anything similar to the filtering provided by the claimed invention and Eastty. Rather than providing a filter processing even and odd samples, McNeely discloses a filter that utilizes a stream of samples (and appropriate offset values relating to that stream) in order to produce real and imaginary components of the filtered stream.

It appears that the language of McNeely may have caused some confusion regarding its function and operation. At the bottom of column 3 (line 60 +) and the top of column 4 (to line 4) McNeely explains that the N-tap filter 306 has an odd number of taps (55 taps) and that the even numbered taps (tap 2, tap 4, tap 6, etc.) are included in sub-filter 308 and the odd numbered taps (tap 1, tap 3, tap 5, etc.) are included in (sub-filter 310. This "even" and "odd" language merely describes which taps are in the different sub-filters and does not relate in any way to odd or even samples being processed. There is no indication in McNeely that odd or even data is supplied to the N-tap filter 306 or

either of the sub-filters 308, 310. Indeed, to the contrary, McNeely explains that the stream of samples 304-S is simultaneously applied to every multiplier in both sub-filters 308, 310 (column 4, lines 20-27 of McNeely).

There appears to be similar language confusion in the discussion which follows Table 1 appearing column 4, lines 50-54 of McNeely. In the discussion appearing in column 4, lines 56-65, McNeely mentions that the multiplexor 311 toggles between the sub-filters 308 and 310 during each odd sample period and each even sample period. However, the sample periods being referred to are those in Table 1, and not to any form of odd or even input data. More specifically, in Table 1 McNeely provides a specific pattern of real and imaginary output components. In order to achieve this pattern of real and imaginary output components, McNeely must alternatively draw data from the alternate sub-filters 308 and 310 in the manner described. However, again this does not relate to any form of processing of odd or even samples as in the claimed invention and in Eastty.

Therefore, it is Appellants position that McNeely is fundamentally unrelated to either Eastty or the claim invention because the structure disclosed in McNeely does not process even and odd samples to achieve anything similar to the filtering provided by the claimed invention and Eastty. Rather than providing a filter processing even and odd samples, McNeely discloses a filter that utilizes a stream of samples (and appropriate offset values relating to that stream) in order to produce real and imaginary components of the filtered stream. In other words, McNeely does not provide any form of even or odd filtering, but instead only produces a complex result from a real input. Therefore, Appellants submit that one ordinarily skilled in the art would not have made reference to McNeely when attempting to create a filter for handling odd and even inputs and that the Office Action fails to set forth a prima facia case of obviousness. Thus, the Board is respectfully requested to reconsider and withdraw this rejection.

ii. The References Do Not Teach or Suggest the Claimed Invention

The Office Action proposes that McNeely discloses even sample periods and odd sample periods. In addition, the Office Action states that in McNeely the association of real numbers to even or odd outputs and imaginary numbers to even or odd outputs it is not constant. Further, the Office Action notes that some of the benefits (such as the claimed invention's ability to run at half a rate of conventional devices) is not included in the claims.

However, none of this discussion within the most recent Office Action explains how either of references teaches or suggests the claimed separate summation units that are defined in each of the independent claims. Eastty discloses, in Figure 7 for example, a filter made up of a single summation unit that takes odd and even inputs (4' and 4), and produces a single output 5. McNeely, in Figures 3 and 4 illustrates a vestigial sideband (VSB) converter 200 that is designed to derive both the real and imaginary components of a complex output stream (column 2, lines 60-64 of McNeely). This VSB converter 200 includes a finite impulse response filter 306 that receives, as inputs, a stream of samples 304-S and an offset value to this stream of samples 304-P and which produces, as output, an ongoing stream of complex samples in which both the real and imaginary components have non-zero values (column 3, lines 57-60 of McNeely). This filter does not relate in any way to the claimed filter or the filter in Eastty which takes odd and even inputs and processes these inputs.

As mentioned above, the language of McNeely may have caused some confusion regarding its function and operation. At the bottom of column 3 (line 60 +) and the top of column 4 (to line 4) McNeely explains that the N-tap filter 306 has an odd number of taps (55 taps) and that the even numbered taps (tap 2, tap 4, tap 6, etc.) are included in sub-filter 308 and the odd numbered taps (tap 1, tap 3, tap 5, etc.) are included in (sub-filter 310. This "even" and "odd" language merely describes which taps are in the different

sub-filters and does not relate in any way to odd or even samples being processed. There is no indication in McNeely that odd or even data is supplied to the N-tap filter 306 or either of the sub-filters 308, 310. Indeed, to the contrary, McNeely explains that the stream of samples 304-S is simultaneously applied to every multiplier in both sub-filters 308, 310 (column 4, lines 20-27 of McNeely).

There appears to be similar language confusion in the discussion which follows Table 1 appearing column 4, lines 50-54 of McNeely. In the discussion appearing in column 4, lines 56-65, McNeely mentions that the multiplexor 311 toggles between the sub-filters 308 and 310 during each odd sample period and each even sample period. However, the sample periods being referred to are those in Table 1, and not to any form of odd or even input data. More specifically, in Table 1 McNeely provides a specific pattern of real and imaginary output components. In order to achieve this pattern of real and imaginary output components, McNeely must alternatively draw data from the alternate sub-filters 308 and 310 in the manner described. However, again this does not relate to any form of processing of odd or even samples as in the claimed invention and in Eastty.

Therefore, it is Appellants position that McNeely is fundamentally unrelated to either Eastty or the claim invention because the structure disclosed in McNeely does not process even and odd samples to achieve anything similar to the filtering provided by the claimed invention and Eastty. Rather than providing a filter processing even and odd samples, McNeely discloses a filter that utilizes a stream of samples (and appropriate offset values relating to that stream) in order to produce real and imaginary components of the filtered stream. In other words, McNeely does not provide any form of even or odd filtering, but instead only produces a complex result from a real input. Therefore, because McNeely is so fundamentally unrelated to the structure disclosed in Eastty, McNeely adds nothing to the teaching of Eastty and cannot cure the deficiency of Eastty that is admitted in the Office Action.

The Office Action admits that Eastty does not teach outputs for the even and odd samples, and relies upon McNeely for this teaching. As explained in column 4, lines 32-36 of McNeely, this reference actually requires that the outputs of sub-filters 308 and 310 are used to produce a complex output from filter 306. Therefore, McNeely does not teach this claimed feature either, but instead merely teaches the conventional process of deriving imaginary and real outputs from real inputs.

Because the invention provides an interleaved structure, the claimed invention can process data at twice the rate of the non-interleaved structures shown in Eastty and McNeely. Thus, as shown in greater detail below, it is Appellant's position that the proposed combination of references does not teach the claimed invention.

The claimed structure shown in Appellant's Figure 3 includes one set of summation units that output an even filter output (the upper set of summation units) and a second set of summation units that output an odd filter output (the lower set of summation units). With respect to the claimed structure, independent claims 1 and 15 define that "a first set of summation units has an even output and a second set of said summation units has an odd output." Independent claim 8 similarly defines that "a first set of successive partial summation units has an even output and a second set of said successive partial summation units has an odd output."

With respect to Eastty, Appellant similarly submits that only a single output is illustrated and that this reference does not teach or suggest the claimed structure that provides one set of summation units to produce an even output and a second set of summation units to produce an odd output. More specifically, Figure 7 of Eastty illustrates a single output 5 at the lower right-hand corner. Further, the Office Action admits that Eastty does not teach outputs for the even and odd samples, and relies upon McNeely for this teaching. Therefore, Appellant again respectfully submits that Eastty does that teach or suggest the claimed invention that utilizes a first set of summation units to produce an even output and a second set of summation units to produce an odd output as claimed and illustrated in Appellant's Figure 3.

McNeely combines a real output with an imaginary output to produce a complex output. More specifically, McNeely explains that filter 306 and each of its component sub-filters 308 and 310 are real (i.e., not complex) filters, and the combination of sub-filter 308, sub-filter 310 and multiplexer 311 operate together to provide a complex output from filter 306. Therefore, McNeely does not teach this claimed feature either, but instead merely teaches a filter that produces real and imaginary components of a signal stream.

While neither reference teaches the claimed invention, the Office Action states that making the combined odd and even outputs separable does not patently distinguish the claimed invention over the prior art. However, the invention does more than simply make combined items separable. To the contrary, the claimed interleaved inventive structure is able to process twice the number of samples per cycle when compared to the conventional full rate filter. Therefore, the inventive structure is a substantial improvement over conventional filters. The invention reduces the size and cost of the filter by reducing the number of latches required. An additional benefit produced by the invention is a reduction in power consumption. Latches represent a large percentage of the power requirements of a filter. Since, again, the number of latches has been substantially reduced, the amount of power consumed by the inventive the filter is substantially reduced.

Because neither Eastty nor McNeely teach or suggest that the circuit should include a first set of summation units to produce an even output and a second set of summation units to produce an odd output, any combination of these references would not teach or suggest this feature of the invention. Therefore, Appellant respectfully submits that independent claims 1 and 15 are patentable over the proposed combination of references because the references do not teach or suggest that "a first set of summation units has an even output and a second set of said summation units has an odd output." Similarly, independent claim 8 is also patentable over the proposed combination of references because the references do not teach or suggest that "a first set of successive

partial summation units has an even output and a second set of said successive partial summation units has an odd output.

Thus, the Board is respectfully requested to reconsider and withdraw this rejection.

b. The Independent Patentability of Dependent Claims 2-4, 6, 7, 9-11, 13, 14, 16, 17, 19, and 20

The following discussion demonstrates that the combination of Eastty and McNeely does not teach or suggest the invention defined by the dependent claims, but also that the dependent claims are independently patentable over their associated independent claims and do not stand or fall with their associated independent claims.

Claims 2 and 9 define the each of the delay elements is connected to an adder of a successive partial summation unit. This is clearly shown in Figure 3 where each of the delay elements D is connected to an adder 13 of a successive partial summation unit. There is no teaching or suggestion in the prior art of record of using such a structure that includes the inventive sets of summation units, as suggested above. Therefore, the combined teachings of Eastty and McNeely would not teach or suggest to one ordinarily skilled in the art the features that are defined by dependent claims 2 and 9. Thus, it is Applicants position that dependent claims 2 and 9 are independently patentable on their own over the prior of record.

Claims 3, 10, and 16 define that an initial delay element is connected to an initial multiplier, where the initial delay unit supplies an initial delayed sample to an adder of an initial summation unit, and claims 4, 11, and 17 define that the multipliers receive the samples in an undelayed state. For example, as shown in Figure 3, the odd samples are processed through an initial delay unit D while the even samples are not. As shown above, none of the prior art of record teaches or suggest the unique structure shown in

Figure 3. Therefore, there cannot be any teaching or suggestion of the use of such a delay element in such a structure. Thus, any combination of Eastty and McNeely does not teach or suggest an initial delay element is connected to an initial multiplier or that the multipliers receive the samples in an undelayed state, as defined by the dependent claims 3, 4, 10, 11, 16, and 17, which indicates that these features are novel and are independently patentable over their respective independent claims.

Claims 6, 13, and 19 define that the non-recursive filter comprises an interleaved non-recursive filter receiving odd and even samples and the adder receives an odd multiplied sample from one of the two multipliers and an even multiplied sample from a second of the two multipliers. Once again, the invention's ability to produce even and odd outputs, as shown in Figure 3, is a feature that is not taught or suggested by the prior of record, because nothing in the record teaches or suggests the structure shown in Figure 3. Thus, any combination of Eastty and McNeely does not teach or suggest interleaved non-recursive filter defined by dependent claims 6, 13, and 19, which indicates that these features are novel and are independently patentable over their respective independent claims.

Claims 7, 14, and 20 define that the delay elements control the samples such that each of the adders receives at most two of the samples. There is no corresponding structure in either of the applied prior references which would teach or suggest to one ordinarily skilled in the art that the delay elements control the samples so that each of the adders receives only two of the samples in a structure that separates the sets of summation units for processing even samples and odd examples. Thus, any combination of Eastty and McNeely does not teach or suggest that the delay elements control the samples such that each of the adders receives at most two of the samples, as defined by dependent claims 7, 14, and 20, which indicates that these features are novel and are independently patentable over their respective independent claims.

Thus, as shown above, dependent claims 2-4, 6, 7, 9-11, 13, 14, 16, 17, 19 and 20 are similarly patentable, because they depend from claims 1, 8, and 15 and because they

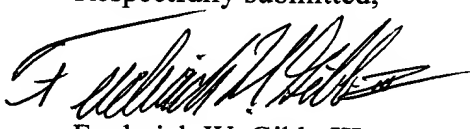
define novel features themselves. Thus, the Board is respectfully requested to reconsider and withdraw this rejection.

X. CONCLUSION

In view the forgoing, the Board is respectfully requested to reconsider and withdraw the rejections of claims 1-4, 6-11, 13-17, 19, and 20.

Please charge any deficiencies and credit any overpayments to Attorney's Deposit Account Number 09-0456.

Respectfully submitted,



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APPENDIX

1. (Previously Presented) A non-recursive filter for receiving samples and generating a filtered signal, said filter comprising:

a first input for receiving even samples;

a second input for receiving odd samples;

two sets of summation units, wherein a first set of summation units has an even output and a second set of said summation units has an odd output, and wherein each set of summation units includes a plurality of summation units, each of said summation units comprising:

two multipliers directly connected to said input, said multipliers multiplying said samples and providing multiplied samples; and

an adder connected to said multipliers, said adder adding said multiplied samples and providing added samples; and

a plurality of delay elements positioned between said summation units, said delay elements receiving said added samples and providing a delayed output of said added samples to a successive summation unit of said summation units.

2. (Previously Presented) The non-recursive filter in claim 1, wherein each of said delay elements is connected to an adder of said successive summation unit.

3. (Original) The non-recursive filter in claim 1, further comprising an initial delay element connected to an initial multiplier, said initial delay unit supplying an initial delayed sample to an adder of an initial summation unit.

4. (Previously Presented) The non-recursive filter in claim 1, wherein said multipliers receive said samples in an undelayed state.

5. (Cancelled).

6. (Previously Presented) The non-recursive filter in claim 1, wherein said non-recursive filter comprises an interleaved non-recursive filter receiving odd and even samples and said adder receives an odd multiplied sample from one of said two multipliers and an even multiplied sample from a second of said two multipliers.

7. (Original) The non-recursive filter in claim 1, wherein said delay elements control said samples such that each of said adders receives at most two of said samples.

8. (Previously Presented) A non-recursive filter for receiving samples and generating a filtered signal, said filter comprising:

two sets of successive partial summation units, wherein a first set of successive partial summation units has an even output and a second set of said successive partial summation units has an odd output, and wherein each set of successive partial summation units includes a plurality of successive partial summation units, each partial summation unit having two multipliers for multiplying an undelayed state of each of said samples, and an adder for adding multiplied samples; and

a plurality of delay elements each coupled to said adder for receiving added samples and for providing a delayed output of said added samples to a successive partial summation unit.

9. (Original) The non-recursive filter in claim 8, wherein each of said delay elements is connected to an adder of said successive partial summation unit.

10. (Original) The non-recursive filter in claim 8, further comprising an initial delay element connected to an initial multiplier, said initial delay unit supplying an initial delayed sample to an adder of an initial summation unit.

11. (Previously Presented) The non-recursive filter in claim 8, wherein said multipliers receive said samples in an undelayed state.

12. (Cancelled).

13. (Previously Presented) The non-recursive filter in claim 8, wherein said non-recursive filter comprises an interleaved non-recursive filter receiving odd and even samples and said adder receives an odd multiplied sample from one of said two multipliers and an even multiplied sample from a second of said two multipliers.

14. (Original) The non-recursive filter in claim 8, wherein said delay elements control said samples such that each of said adders receives at most two of said samples.

15. (Previously Presented) An interleaved non-recursive filter for receiving samples and generating a filtered signal, said filter comprising:

a first input for receiving even samples;

a second input for receiving odd samples;

two sets of summation units, wherein a first set of summation units has an even output and a second set of said summation units has an odd output, and wherein each set of summation units includes:

a plurality of multipliers directly connected to said input, said multipliers multiplying said samples and providing multiplied samples;

a plurality of adders, each of said adders being connected to two of said multipliers, said adders adding said multiplied samples and providing added samples; and

a plurality of delay elements positioned between said adders, said delay elements receiving said added samples and providing a delayed output of said added samples to a successive adder of said adders.

16. (Original) The interleaved non-recursive filter in claim 15, further comprising an initial delay element connected to an initial multiplier, said initial delay unit supplying an initial delayed sample to an initial adder.

17. (Original) The interleaved non-recursive filter in claim 15, wherein said multipliers receive said samples in an undelayed state.

18. (Cancelled).

19. (Previously Presented) The interleaved non-recursive filter in claim 15, wherein said samples comprise odd and even samples and said adder receives an odd multiplied sample from one of said two multipliers and an even multiplied sample from a second of said two multipliers.

20. (Original) The interleaved non-recursive filter in claim 15, wherein said delay elements control said samples such that each of said adders receives at most two of said samples.

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OIPE JUN 18 2004 JC03 PATENT & TRADEMARK OFFICE

TRANSMITTAL OF APPEAL BRIEF (Large Entity)

Docket No. BU990217US1

Re Application Of: **Brian Allen**

Application No.	Filing Date	Examiner	Customer No.	Group Art Unit	Confirmation No.
09/496,111	February 1, 2000	Williams, Dementria A.	29154	2631	

Invention: **INTERLEAVED FINITE IMPULSE REPONSE FILTER**

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COMMISSIONER FOR PATENTS:

Transmitted herewith in triplicate is the Appeal Brief in this application, with respect to the Notice of Appeal filed on **April 20, 2004**

The fee for filing this Appeal Brief is: **$330.00**

☐ A check in the amount of the fee is enclosed.

☒ The Director has already been authorized to charge fees in this application to a Deposit Account.

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Signature

Dated: **June 16, 2004**

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